

NON-PUBLIC?: N  
ACCESSION #: 9007050105

LICENSEE EVENT REPORT (LER)

FACILITY NAME: Surry Power Station, Unit 2 PAGE: 1 OF 5

DOCKET NUMBER: 05000281

TITLE: Manual Reactor Trip Due to Failure of "A" Main Feedwater  
Regulating Valve  
EVENT DATE: 05/31/90 LER #: 90-003-00 REPORT DATE: 06/28/90

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: M. R. Kansler, Station Manager TELEPHONE: (804) 357-3184

COMPONENT FAILURE DESCRIPTION:  
CAUSE: X SYSTEM: SJ COMPONENT: FCV MANUFACTURER: B045  
REPORTABLE NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On May 31, 1990 at 2005 hours with Unit 2 at 100% power, a manual reactor trip was initiated by the Unit 2 licensed control room operator. A malfunction of the "A" Main Feedwater Regulating Valve (MFRV) positioner caused the valve to close, decreasing feedwater flow to the "A" Steam Generator (S/G) to near zero. Operators performed the appropriate plant procedures and quickly stabilized the plant following the trip. Safety systems functioned as designed with the exception that one Individual Rod Position Indicator (IRPI) rod bottom bistable light failed to illuminate and several others did not illuminate immediately. The failure of the MFRV was caused by blockage of the positioner air supply inlet filter/orifice assembly. The failure of the rod bottom light to illuminate was caused by a faulty light bulb. The delayed illumination of the other rod bottom lights was the result of a semi-vital bus voltage fluctuation. The maintenance procedure will be revised to require

replacement of the filter/orifice assemblies during each refueling. Operation of the load tap changer for the "C" Reserve Station Service Transformer (RSST) is under evaluation. A four hour non-emergency report was made to the Nuclear Regulatory Commission per 10CFR 50.72.b.2.ii.

END OF ABSTRACT

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## 1.0 Description of the Event

On May 31, 1990 at 2005 hours, Surry Unit 2 was operating at 100% power when several annunciators alarmed indicating a mismatch between feedwater flow and steam flow in the "A" Steam Generator (S/G). The operator observed that the "A" Main Feedwater Regulating Valve (MFRV) (EHS-FCV) indicated fully closed, and he noted that feedwater flow to the "A" S/G had decreased to approximately zero. The reactor operator quickly placed the valve in manual control, but was unable to open the valve. Since a low S/G level coincident with steamflow-feedflow mismatch reactor trip was imminent, the reactor operator manually tripped the reactor when the "A" S/G narrow range level decreased to 26% level.

Following the trip, safety systems functioned as designed with the exception that the operators noticed that approximately six Individual Rod Position Indicator (IRPI) (EHS-ZI) rod bottom bistable lights did not illuminate immediately. Within 50 seconds from the reactor trip, all but one IRPI (F-12) rod bottom light illuminated; however, its IRPI position indicated that the rod was fully inserted.

## 2.0 Safety Consequences and Implications

The reactor trip on main steam flow-feedwater flow mismatch coincident with a low water level (20%) in any S/G provides protection against an anticipated loss of normal feedwater. Since the reactor was manually tripped before the automatic setpoint was reached, there was no challenge to the reactor protection system. The Auxiliary Feedwater System functioned as designed to supply water to the S/Gs following the trip.

After the reactor trip, the immediate actions of Procedure E-0, "Reactor Trip or Safety Injection", were satisfied by confirming that the reactor trip breakers were open and that neutron flux was decreasing as expected. Procedure ES-0.1, "Reactor Trip Response", requires emergency boration if more than one control rod is not

fully inserted, however,

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all but one IRPI rod bottom light were illuminated by the time that step was reached, making emergency boration unnecessary. All other safety related systems and equipment remained operable and plant parameters remained well within the bounds of the safety analysis. Therefore, the health and safety of the public were not affected.

### 3.0 Cause

The "A" S/G MFRV failed shut at 100% power due to a malfunction of its valve positioner. Inspection of the positioner revealed a buildup of dirt and other matter on the positioner air supply inlet filter/orifice assembly which caused blockage of air flow through the valve positioner. This resulted in zero output from the positioner causing the MFRV to close. The manufacturer indicated that over time a deposit can build up due to o-ring lubricant and contaminants contained in instrument air systems. The failure of IRPI F-12 bottom light to illuminate was due to a faulty light bulb. The bulb was subsequently replaced. The delay of the IRPI rod bottom lights to illuminate was determined to be due to voltage fluctuations on the semi-vital bus which drove the output of the IRPI signal conditioner outside of its calibration range. The semi-vital bus voltage fluctuation was caused by the "C" Reserve Station Service Transformer (RSST) load tap changer (LTC) raising the 4160V 2J emergency bus voltage to 4650V. It is suspected that the LTC did not perform as designed during the load shed.

### 4.0 Immediate Corrective Action(s)

Operators followed appropriate plant procedures and quickly stabilized the unit following the reactor trip. The Shift Technical Advisor performed the critical safety function status tree review to ensure specific plant parameters were noted and that those parameters remained within safe bounds.

An investigation was started to determine the cause of the MFRV malfunction.

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### 5.0 Additional Corrective Action(s)

The maintenance department replaced the positioner on the "A" MFRV

and the filter/orifice assemblies on the other two Unit 2 MFRVs and all three Unit 1 MFRVs. All the MFRVs were then tested satisfactorily.

Computer data was reviewed to identify the control rods whose IRPI rod bottom lights did not immediately illuminate after the trip. Control rod drop time tests were performed on the identified control rods and their drop times were determined to be within Technical Specification limits.

An initial evaluation of the suspected problem with the operation of the LTC determined that it was not a safety concern. Consequently, no immediate corrective actions were required.

#### 6.0 Action(s) Taken to Prevent Recurrence

The applicable maintenance procedure will be revised to require that the filter/orifice be replaced once per refueling.

An engineering evaluation is being performed to evaluate the "C" RSST LTC response during a load shed event. Appropriate actions will be taken following the evaluation. Also, evaluations of enhancements to the IRPI system and its power supply are being conducted.

#### 7.0 Similar Events

The following LERs describe events where MFRV malfunctions led to reactor trips.:

Unit 1 LER 86-001. The closure of the MFRV was due to loss of station instrument air.

Unit 1 LER 86-010. The MFRV feedback cam was not adjusted following maintenance.

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Unit 2 LER 84-003. The MFRV failed due to a broken instrument air supply piping.

Unit 2 LER 86-007. The MFRV malfunction was due to metal debris between the plug and valve seat.

#### 8.0 Manufacturer/Model Number(s)

Bailey AP4 Positioner, 11000 series 10

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VIRGINIA ELECTRIC AND POWER COMPANY

Surry Power Station  
P. O. Box 315  
Surry, Virginia 23883

June 28, 1990

U. S. Nuclear Regulatory Commission Serial No.: 90-399  
Document Control Desk Docket No.: 50-281  
Washington, D. C. 20555 License No.: DPR-37

Gentlemen:

Pursuant to Surry Power Station Technical Specifications, Virginia  
Electric and Power Company hereby submits the following Licensee Event  
Report for Unit 2.

REPORT NUMBER

90-003-00

This report has been reviewed by the Station Nuclear Safety and Operating  
Committee and will be reviewed by Corporate Nuclear Safety.

Very truly yours,

M. R. Kansler  
Station Manager

Enclosure

cc: Regional Administrator  
Suite 2900  
101 Marietta Street, NW  
Atlanta, Georgia 30323

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